Demo Case Update

From TZW – DVGW-Technologiezentrum Wasser

27th September 2021

In the last months, TZW worked on two main topics, the test of the nanosensor of the partner CNRS and the development of scientific models for the detection of anomalies in time series of water quality data of the partner 3S.

The test of the nanosensor took place in the model network of the TZW, where two probes were first installed in the laboratory and then in a pipe system and operated under variation of the water quality. The accuracy, stability and quality of the signals were investigated. The focus was particularly on the sensitivity to free chlorine.

In the field of data analysis, water quality data from the nano stations installed in Cannes by 3S were analyzed. The aim is to develop a scientific model for the automated detection of anomalies in the time series. These can be caused for example by unusual value ranges, peaks but also concentration changes (jumps to other levels).

There are a variety of different methods for anomaly detection. A selection is shown in figure 1. Univariate methods consider only one parameter or one time series. Using these methods, a plausibility check of the values can already be performed and expert knowledge (e.g. drinking water guidelines, operator experience) can be used (e.g. checking for compliance with value ranges). In addition, simple univariate methods based on prediction models can also be used. Here, the difference between the predicted value and the value that actually occurred is considered. If the difference is greater than a certain threshold, this may indicate an anomaly. Multivariate methods are based on looking at multiple water quality parameters simultaneously. This can also be done by prediction model-based methods, but also by so-called reconstruction and clustering methods. It is not necessary to choose one method - several methods can be applied simultaneously and the decision about the presence of an anomaly can be reached by voting of the used methods.

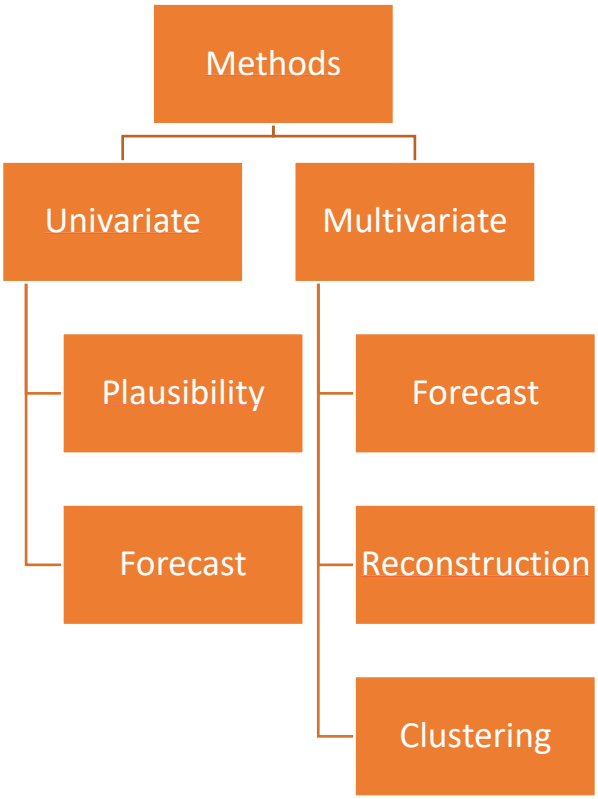

Figure 1: Selection of anomaly detection methods.

The methods used and the results obtained are evaluated and interpreted in collaboration with 3S. The subject of current work is the hyperparameter tuning of the algorithms. The tuning aims at the adjustment of an optimal sensitivity. On the one hand, false alarms should be avoided, but on the other hand, real or relevant events should not be overlooked. The results achieved so far are promising and will be tested for plausibility in cooperation with 3S and the operator SUEZ Eau France.

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Project Consortium

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant agreement No. 821036.